

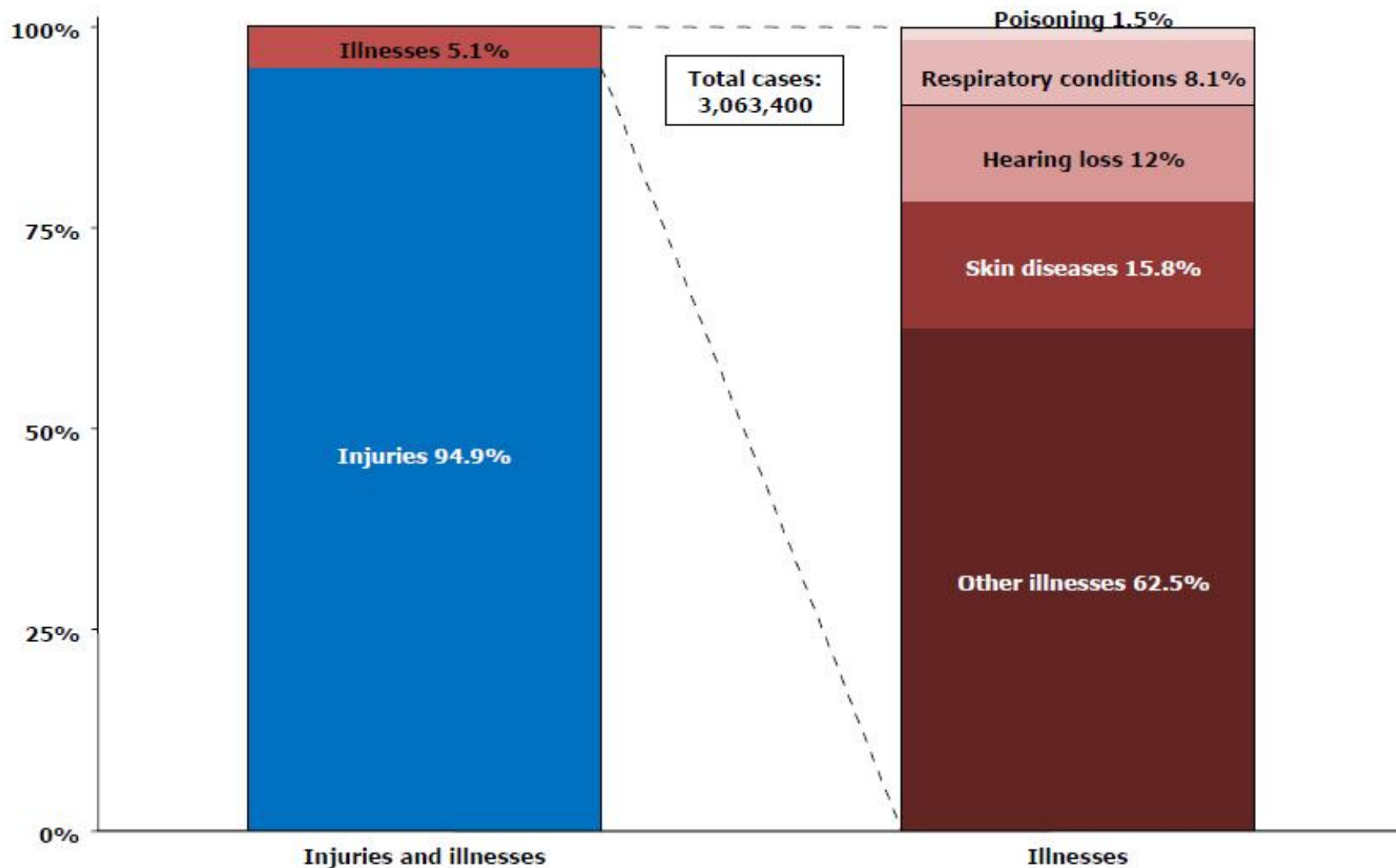
Occupational lung diseases

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Occupational lung diseases

- are a broad group of pulmonary disorders that develop from inhalation of specific particles.
- Historically, they have been a major cause of morbidity and mortality before workplace safety guidelines were rigorously established and enforced.
- Although each disease has a slightly unique presentation, they all lead to progressive deterioration in lung function that can cause severe respiratory compromise if appropriate measures are not undertaken.

**Distribution of nonfatal occupational injury and illness cases
by category of illness, private industry, 2010**



Nonfatal occupational injuries accounted for the overwhelming majority of cases reported for the SOII in 2010—94.9 percent—with illnesses accounting for the remaining 5.1 percent of cases. Most illness cases fall into the “All other illnesses” category, which includes such things as repetitive motion cases and systemic diseases and disorders.

Occupational asthma

- **airflow limitation and airway hyper-responsiveness caused by specific agents inhaled in the workplace.**
- **It does not include activation of pre-existing asthma or airway hyper-responsiveness induced by non-toxic irritants or physical stimuli such as cold air.**
- **Two types of occupational asthma are recognised:**
 - ✓ **Immunological asthma appears after a latent period of occupational exposure;**
 - ✓ **Non-immunological occupational asthma develops without a period of latency and is associated with exposure to high concentrations of irritants also called (reactive airways disease).**

Byssinosis

- ✓ Hypersensitive airways and acute reduction in FEV1 (asthma-like breathing) in susceptible individuals when they are exposed to dusts of cotton or flax.
- ✓ Also called Monday fever or cotton workers' lung.
- ✓ Acute dyspnoea with cough and chest tightness on the first day of the working week, then symptoms improve on subsequent working days, despite continued exposure to the sensitizing agent.
- ✓ As the disease progresses the symptoms recur on subsequent days of the week, and eventually even occur at weekends and during holidays.
- ✓ If the workers who develop byssinosis are not removed from further exposure, they go on to develop long term respiratory impairment and subsequently have an excess risk of mortality from respiratory disease.

Reactive airways disease

Exposure to gases

- ✓ **Accidental inhalation of gas (most commonly chlorine), fume, or vapour with irritant properties can lead to reactive airways disease.**
- ✓ **Frequently, individuals complain of a burning sensation in their nose and throat within minutes of exposure. The symptoms of asthma develop within 24 hours.**
- ✓ **The airway irritability usually resolves spontaneously but can persist indefinitely, and it may be provoked by a range of irritants or other provoking factors—for example, cold.**

Diagnostic criteria for reactive airways disease syndrome

- Individual previously free from respiratory symptoms**
- History of inhalation of gas, fume, or vapour with irritant properties.**
- Rapid onset of asthma like symptoms after exposure**
- Bronchial hyper-responsiveness on methcholine challenge test**

2. Interstitial lung diseases (ILDs)

- are a heterogeneous group of more than 100 diseases that result in inflammation and/or scarring of the lung parenchyma.
- Both occupational and non-occupational ILDs have similar pathophysiology(ies), progressive fibrotic changes, structural abnormalities, and common physiologic sequelae.
- Occupational ILDs have varied latency periods, usually measured in years, and present predominantly or exclusively with pulmonary manifestations.
- Extra pulmonary symptoms and signs rarely occur (eg, cases of beryllium disease, silica-associated autoimmune disease, or renal disease).

Occupational Lung Diseases

Hypersensitivity Pneumonitis

- farmer's lung
- bagassosis
- humidifier/air conditioner lung
- bird breeder's lung
- cheese worker's lung
- malt worker's lung
- paprika splitter's lung
- mollusk shell hypersensitivity
- chemical worker's lung
- wheat weevil

Pneumoconiosis

- asbestosis
- berylliosis
- silicosis
- coal worker's lung
- byssinosis
- baritosis
- chalicosis

Pneumoconiosis

- **Pneumoconiosis is the generic term for the inhalation of mineral dust and the resultant diffuse, usually fibrotic, reaction in the acinar part of the lung.**
- **The term excludes asthma, neoplasia, and emphysema.**
- **Hundreds of types of pneumoconioses have been identified, but only three are common : asbestosis, silicosis, and coal workers' pneumoconiosis.**
- **In these conditions, the radiologic findings result from the accumulation of inflammatory and fibrotic responses triggered by dust deposition.**

Coal Worker's Pneumoconiosis (CWP)

- Also known as black lung disease
- Interstitial lung disease result from long term exposure (usually more than 20 years) to high levels of Coal dust.
- Simple CWP is largely only an abnormality on the chest radiograph; there are small spots in the upper lung zones that reflect inhalation of coal dust, but nothing more.
- Symptoms include shortness of breath, cough may be chronic and problematic in patients even after they leave the workplace and lowered pulmonary function.

- However, it can develop into complicated CWP, which is also called progressive massive fibrosis in which the smaller shadows coalesce into large nodules, 1 to 2 centimeters in diameter.
- These lesions can distort and destroy normal lung architecture and result in severe shortness of breath, disability and can lead to death.
- CWP is diagnosed based on chest X-ray or CT findings, and a history of work in coal mines.
- There is no cure for coal worker's pneumoconiosis.

Caplan Syndrome

- **Exposure to coal dust has been found to result in airflow obstruction and chronic bronchitis and is also associated with the development of rheumatoid arthritis, which when combined with CWP is known as Caplan syndrome**

What is asbestos ?

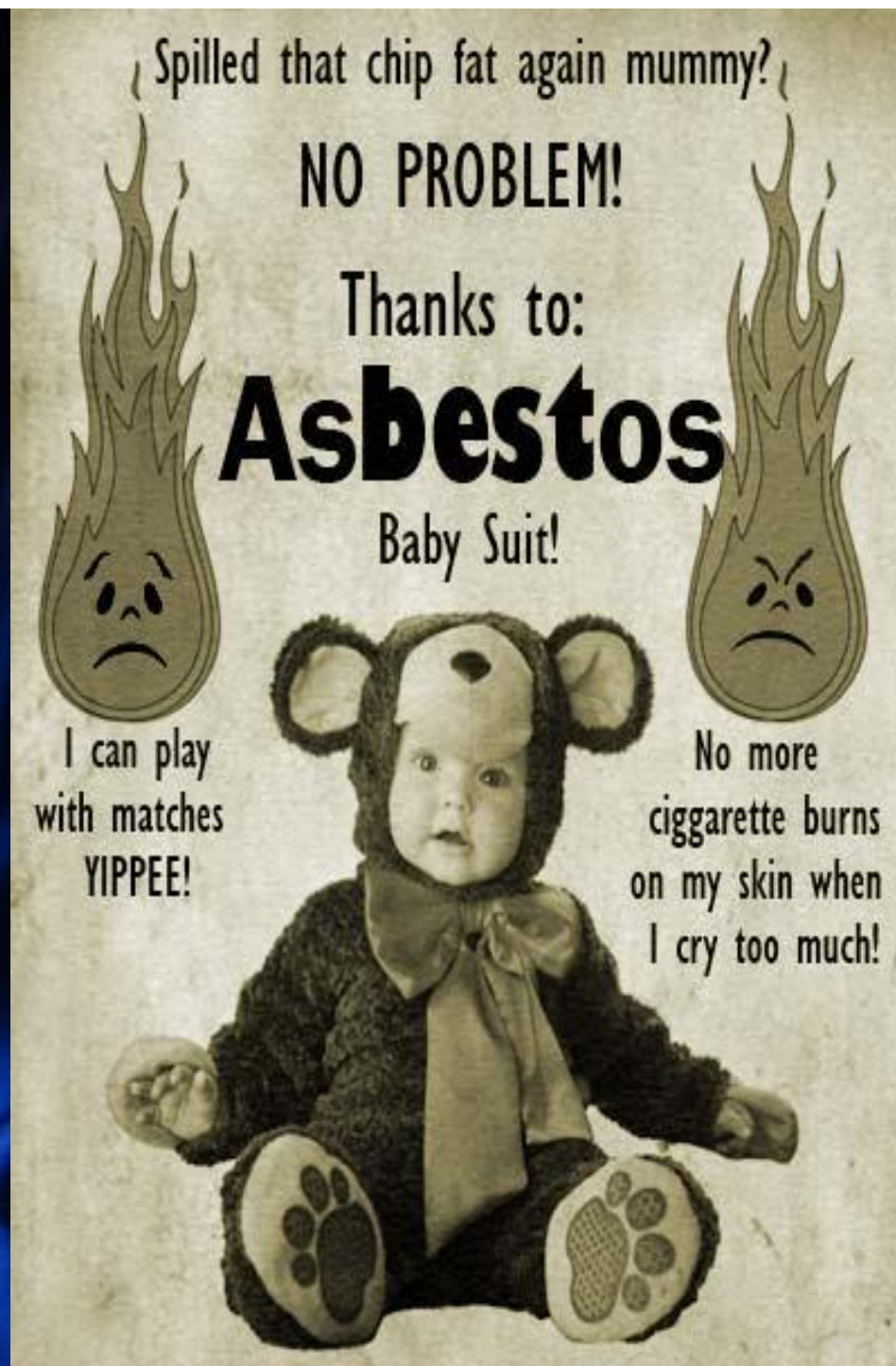
- **Asbestos** is a set of six naturally occurring silicate minerals , which is called by that name due to asbestiform habit :
- long thin fibrous crystals, and each visible fiber composed of millions of microscopic "fibrils" that can be released by abrasion and other processes



Characteristics of asbestos ?

Asbestos fibers are:

- Very strong
- Highly flexible
- Resistant to breakdown by acid, alkali, water, **heat**, and **flame**
- Non-biodegradable
- Environmentally persistent





Pathophysiology and health effects

Factors

- Small so can travel deeper into the lungs
- Sharp penetrate through tissues
- Hydrophobic can't be coughed out
- Contain Iron so can be oxidised damaging nucleus

Diseases ?

Respiretory :

- q **Parenchymal asbestosis : Diffuse interstitial fibrosis**
- q **Asbestos-related pleural abnormalities**
 - Pleura plaques
 - Benign asbestos pleural effusions
 - Diffuse pleural thickening
 - Pleural mesothelioma
- q **Lung carcinoma**

It depends on:

- **Nature and extent of exposure**
- **Concentration of asbestos fibers**
- **Duration of exposure**
- **Frequency of exposure**
- **Cigarette smoking**

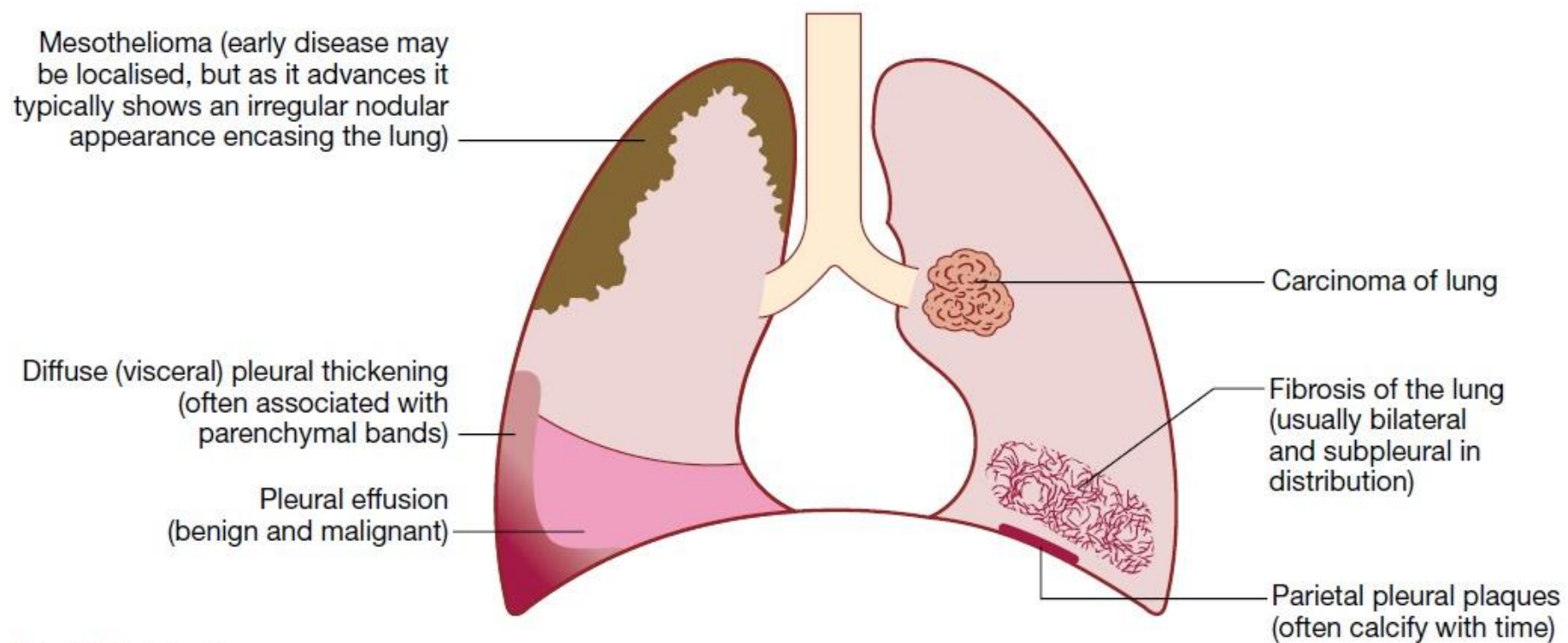
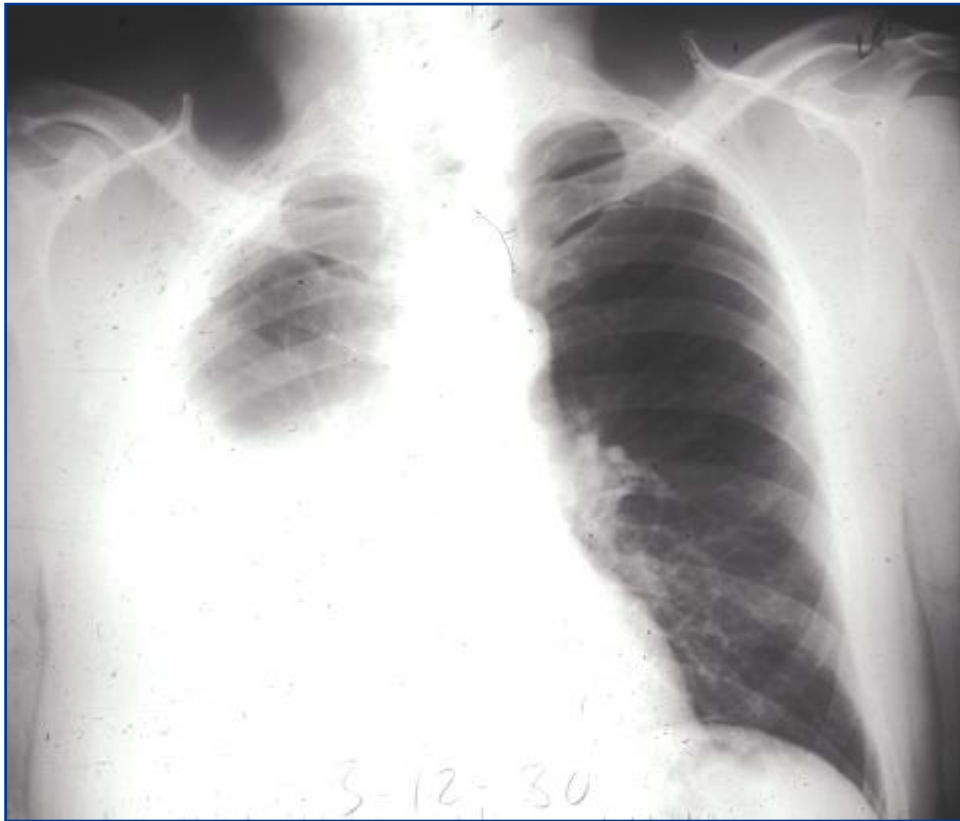


Fig. 19.56 Asbestos exposure. The range of possible effects on the respiratory tract.



Mesothelioma



Plural plaques

Silicosis

- occupational lung disease caused by inhalation of crystalline silica dust
- marked by inflammation and scarring in the form of nodular lesions in the upper lobes of the lungs.



It is found in many **rocks**, such as granite, sandstone, gneiss and slate, and in some **metallic ores**.

Silica can be a main component of sand. It can also be in soil, mortar, plaster, and shingles.

- The cutting, breaking, crushing, drilling, grinding, or abrasive blasting of these materials may produce fine to ultra fine airborne silica dust.





Classification of silicosis

1. **Chronic simple silicosis** : long-term exposure (10 years or more) + low concentrations of silica dust → appearing 10–30 years after first exposure
2. **Accelerated silicosis** : develops 5–10 years after first exposure to higher concentrations of silica dust
3. **Complicated silicosis** : complicated by progressive Massive fibrosis
4. **Acute silicosis** : develops a few weeks to 5 years after exposure to high concentrations of silica dust → death

Pathophysiology

- When silica dust particles are **inhaled** → **embed** deeply into the tiny **alveolar sacs** and **ducts** in the lungs.
- There, the lungs **cannot** clear out the dust by mucous or coughing.
- crystalline silica dust **deposited** in the lungs → **macrophages** **ingest** the dust particles → **inflammation response**
→ **produce collagen** around the silica particle → **fibrosis** and the formation of the **nodular lesions**.

There is only abnormal chest X-ray in the beginning and then slowly develop a cough and breathing difficulty.

More than a third of people with silicosis have phlegm production and cough

Chronic bronchitis-like symptoms may occur, and the lungs have additional sounds called wheezes and crackles.

Compensatory emphysema may develop also.

2. Hypersensitivity pneumonitis (HP),

- also known as extrinsic allergic alveolitis,
- **Granulomatous** inflammatory reaction caused by an immunological response to certain inhaled **organic dusts** and some low molecular weight chemicals.
- Farmer's lung (an immune response to spores of thermophilic actinomyces bacteria) and bird fancier's lung remain the most prevalent forms of the disease.
- others including humidifier lung, and mushroom picker's disease.

Hypersensitivity pneumonitis (Cont.),

- Diagnosis based on history, physical examination, and radiographic findings.
- Patients may report fever, chills, malaise, cough, dyspnea, and headaches 4-6 hours after heavy exposure to an inciting agent in **acute HP**.
- **Chronic** extrinsic allergic alveolitis is caused either by chronic exposure to low doses of the causative antigen, or as a consequence of repeated attacks of acute alveolitis over many years.
- Characterized by cough, progressive dyspnea, fatigue, anorexia, and weight loss.

- On examination, patients may present with fever, tachypnea, and diffuse fine basilar crackles; with muscle wasting, clubbing, and respiratory distress in severe cases.
- Chest radiographs may show micronodular or reticular opacities in acute or subacute HP and progressive fibrosis with lung volume loss in chronic HP.

- **Bagassosis:** This is a form of Hypersensitivity Pneumonitis which is caused as a result of exposure to sugarcane fiber waste.
- **Bird Fancier's Lung** caused as a result of dust present in the feathers of birds.
- **Farmers Lung:** induced by the inhalation of biologic dusts coming from hay dust or mold spores or any other agricultural products



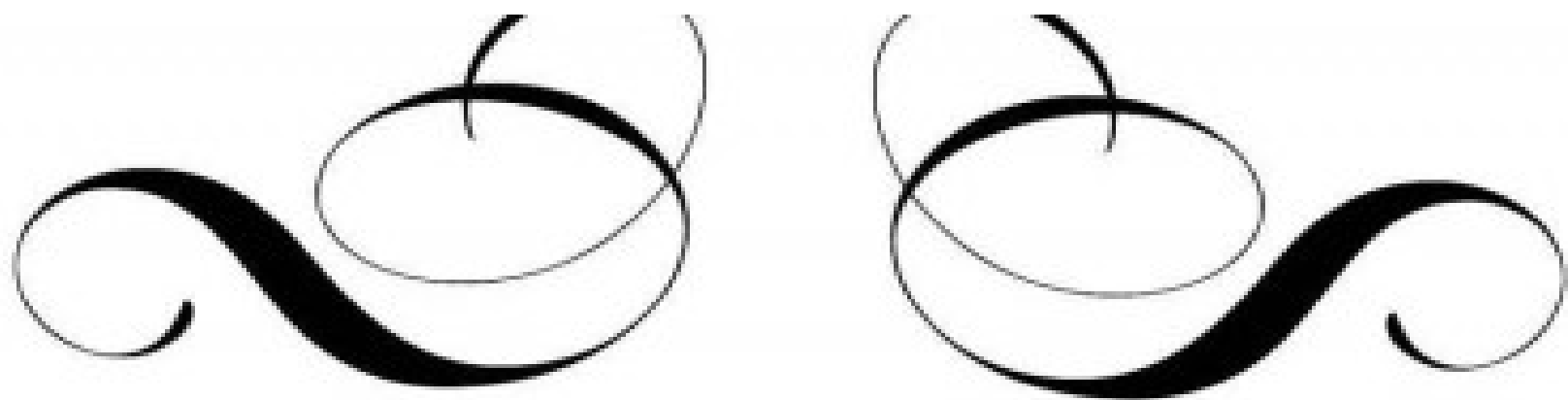


Lung Cancer

- A number of occupations or occupational exposures are established or suspected risk factors for lung cancer.
- The International Agency for Research on Cancer has identified some occupational exposure factors as being carcinogenic to the human lung (aluminum production, arsenic, asbestos, beryllium, cadmium, hexavalent chromium, coke and coal gasification fumes, crystalline silica, nickel, radon, and soot)
- Depending on the agent, additive or multiplicative modes of interaction have been shown to operate with cigarette smoking.

Lung infections:

- **contact with other people who are ill**
- **infected from a source at work, such as a contaminated humidifier.**
- **Influenza and other infections such as tuberculosis or legionella can be occupational infections.**



Thank You

